Canine Surgical Wounds:
Harnessing the power of
FLUORESCENT LIGHT ENERGY
to promote the healing process

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INTRODUCTION

Wound healing is a complex biological process comprised of a series of sequential events aiming to repair injured tissue.

It starts immediately after injury and it requires a synchronized interplay among cells, growth factors, and extracellular matrix proteins. Multiple causes influence this process, including blood supply, defect size, tension, mobility, susceptibility to infection, type of wound and condition of the underlying tissue. Excessive, continuous, and chronic inflammation may affect healing and prevent morphofunctional normality, resulting instead in the formation of disoriented connective tissue.

This abnormal architecture reduces mechanical strength of tissues and leads to scar formation.

AIM OF THE STUDY

The study aimed to **evaluate the effect of Fluorescent Light Energy** (FLE) on the healing of cutaneous incisional wounds.

MATERIAL AND METHODS

Ten healthy client-owned dogs undergoing orthopaedic surgery were prospectively recruited.

- **50% of the length of the surgical** wound was cleaned with sterile saline solution and treated with Fluorescent Light Energy (from the first day after orthopaedic surgery (T0) and every 3 days until day 13 (T4).
- **50% was only cleaned** with sterile saline solution.

Surgical wound evaluation consisted of:

- **Clinical assessment** (ASEPSIS scale) taken from T0 to T4,
- **Histological** (semiquantitative score) and immuno-histochemical analysis of treated and control samples taken at T4.

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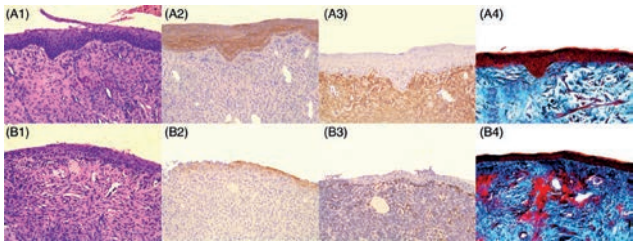
RESULTS

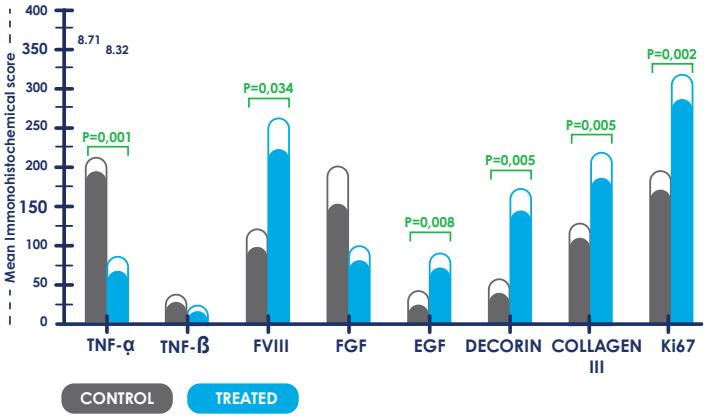
The areas treated with FLE achieved **lower histology scores** (P = 0.001), consistent with complete re-epithelialization, less inflammation of the dermal layer, high neoangiogenesis and greater and more regular deposition of collagen (Figure 1). Expression of FVIII, EGF, decorin, collagen II and Ki-67 was higher and expression of TNF-α was lower in treated wounds (Figure 2).

FIGURE 1. Histologic appereance of wounds



(A) portion treated with FLE, (B) untreated portion.
(A1),(B1), Hematoxylin & eosin coloration. Epidermal integrity and basal activity (greater dermic papillary fever) seemed greater in treated wounds (A1), while no residual phlogosis and high neoangiogenesis were noted compared with the control sample in (B1).
(A2),(B2), Immunoblotting for (AE1/AE3). Note the strong cytokeratinic expression of the (A2) sample compared with the (B2) sample, which is consistent with epidermal integrity in (A2) compared with a partial re-epithelialization in (B2).
(A3),(B3), Collagen immunograde III. The expression of collagen III in (A3) is abundant compared with that in the (B3) sample.
(A4),(B4), Deposition of collagen is more abundant and regular in (A4), whereas greater phlogosis, blood extravasation, and fibrosclerotic processes are present in (B4) (blue tendency to black; Masson's trichrome).

FIGURE 2. Immunohistochemistry scores of treated and control wounds.



CONCLUSION

In this study, the use of Fluorescent Light Energy in uncomplicated surgical wounds improved microscopic features and stimulated the release of cytokines promoting wound healing. In the maturation phase, the sites treated with FLE (Fluorescent Light Energy) exhibited tissue growth and more complete repair tissues.

These histological improvements, orchestrated by several growth factors, should create favorable conditions for the scarring process and may improve the strength of repair tissues. Such effects could reduce the risk of dehiscence, scar formation, keloids, and chronic inflammation. In humans, FLE has shown to be very well tolerated and efficacious in the management of acute and chronic wounds and burns.

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